

CLAIMS:

1. An optical waveguide device, comprising:  
an optical waveguide for transmitting light having a  
5 predetermined wavelength along a first direction that is  
perpendicular to second and third directions, the second and  
third directions being perpendicular to each other; and  
defining surfaces defining the optical waveguide, wherein  
the defining surfaces include a pair facing parts that face  
10 each other along the second direction, wherein the distance  
between the facing parts is less than the half of the  
wavelength of the light transmitted through the optical  
waveguide, and wherein, among the defining surfaces, at least  
the facing parts are made of plasmon activating medium.

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2. The optical waveguide device according to claim 1,  
wherein a measurement of a cross-section of the optical  
waveguide along a plane that is perpendicular to the first  
direction and crosses the facing parts is more than a  
20 predetermined value with respect to the third direction, and  
wherein the predetermined value is computed by dividing the  
phase velocity of surface plasmons generated on the facing  
parts when the optical waveguide transmits light by the speed  
of the light in a vacuum, and then multiplying the division  
25 result by the half of the wavelength of the light.

3. The optical waveguide device according to claim 1,  
wherein the optical waveguide has an outlet for light  
transmitted through the optical waveguide, and wherein the  
30 facing parts are provided at least at portions of the defining  
surfaces that correspond to the outlet.

4. The optical waveguide device according to claim 3,  
wherein a cross-section of the optical waveguide along an  
35 arbitrary plane that is perpendicular to the first direction

is the same as the shape of the outlet.

5. The optical waveguide device according to claim 3,  
further comprising a projection in which the outlet is opened,  
5 the projection projecting in a direction along which light is  
transmitted through the optical waveguide, and wherein at  
least portions of the facing parts are located at portions of  
the defining surfaces that correspond to portions of the  
outlet that project most in the direction along which light is  
10 transmitted.

6. The optical waveguide device according to claim 4,  
wherein the optical waveguide is one of a plurality of optical  
waveguides, and wherein the outlets of the optical waveguides  
15 are linear slits that extend parallel to each other.

7. The optical waveguide device according to claim 1,  
wherein the distance between the facing parts is less than two  
fifths of the wavelength of the light transmitted through the  
20 optical waveguide.

8. The optical waveguide device according to claim 7,  
wherein the distance between the facing parts is less than  
three tenths of the wavelength of the light transmitted  
25 through the optical waveguide.

9. The optical waveguide device according to claim 8,  
wherein the distance between the facing parts is less than one  
fifth of the wavelength of the light transmitted through the  
30 optical waveguide.

10. The optical waveguide device according to claim 9,  
wherein the distance between the facing parts is less than one  
tenth of the wavelength of the light transmitted through the  
35 optical waveguide.

11. The optical waveguide device according to claim 1, wherein each of the facing parts is a first facing part, and wherein the defining surfaces further include a pair of second facing parts that face each other along the second direction, and wherein the distance between the second facing parts is more than the distance between the first facing parts.

10 12. The optical waveguide device according to claim 1, wherein the plasmon activating medium is a dielectric medium having a negative value for the real part of the relative complex permittivity.

15 13. The optical waveguide device according to claim 11, wherein the second facing parts are continuously formed with the first facing parts with respect to the third direction.

20 14. The optical waveguide device according to claim 13, wherein the first facing parts are a pair of a plurality of pairs of first facing parts, and wherein the first facing parts and the second facing parts are alternately and continuously arranged with respect to the third direction.